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UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 C.F.R. § 1.53(b))

Attorney Docket No. 902-578-2

First Inventor or Application Identifier F. Van Der Putten

Title Method to Synchronize Data and a Transmitter and a Receiver etc.
Express Mail Label No. EL 092377405 US

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

1. * Fee Transmittal Form (e.g., PTO/SB/17)
(Submit an original and a duplicate for fee processing)
2. Specification [Total Pages 9]
(preferred arrangement set forth below)
 - Descriptive title of the Invention
 - Cross References to Related Applications
 - Statement Regarding Fed sponsored R & D
 - Reference to Microfiche Appendix
 - Background of the Invention
 - Brief Summary of the Invention
 - Brief Description of the Drawings (if filed)
 - Detailed Description
 - Claim(s)
 - Abstract of the Disclosure
3. Drawing(s) (35 U.S.C. 113) [Total Sheets 1]
4. Oath or Declaration [Total Pages 3]
 - a. Newly executed (original or copy)
 - b. Copy from a prior application (37 C.F.R. § 1.63(d))
(for continuation/divisional with Box 16 completed)
 - i. DELETION OF INVENTOR(S)
Signed statement attached deleting inventor(s) named in the prior application, see 37 C.F.R. §§ 1.63(d)(2) and 1.33(b).

***NOTE FOR ITEMS 1 & 13: IN ORDER TO BE ENTITLED TO PAY SMALL ENTITY FEES, A SMALL ENTITY STATEMENT IS REQUIRED (37 C.F.R. § 1.27), EXCEPT IF ONE FILED IN A PRIOR APPLICATION IS RELIED UPON (37 C.F.R. § 1.28).**

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5. Microfiche Computer Program (Appendix)
6. Nucleotide and/or Amino Acid Sequence Submission
(if applicable, all necessary)
 - a. Computer Readable Copy
 - b. Paper Copy (identical to computer copy)
 - c. Statement verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

7. Assignment Papers (cover sheet & document(s))
8. 37 C.F.R. § 3.73(b) Statement Power of (when there is an assignee) Attorney
9. English Translation Document (if applicable)
10. Information Disclosure Statement (IDS)/PTO-1449 Copies of IDS Citations
11. Preliminary Amendment *to follow shortly after receipt of S/N*
12. Return Receipt Postcard (MPEP 503) (Should be specifically itemized)
13. * Small Entity Statement(s) Statement filed in prior application, (PTO/SB/09-12) Status still proper and desired
14. Certified Copy of Priority Document(s) (if foreign priority is claimed)
15. Other: _____

16. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in a preliminary amendment:

Continuation Divisional Continuation-in-part (CIP)

of prior application No: 08,965,136

Prior application information: Examiner C. Tran

Group / Art Unit: 2746

For CONTINUATION or DIVISIONAL APPS only: The entire disclosure of the prior application, from which an oath or declaration is supplied under Box 4b, is considered a part of the disclosure of the accompanying continuation or divisional application and is hereby incorporated by reference. The incorporation can only be relied upon when a portion has been inadvertently omitted from the submitted application parts.

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Signature	Francis J. Maguire	Date	March 29, 1999
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902-578-2
PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: F. Van Der Putten et al

Serial No.: 0 / Group No.:

Filed: Herewith Examiner:

For: A Method to Synchronize Data and a Transistor and a Receiver Realizing Said Method

Commissioner of Patents and Trademarks
Washington, D.C. 20231

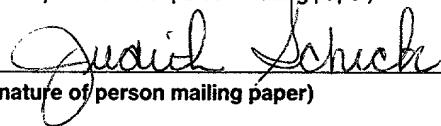
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CERTIFICATE OF MAILING (37 CFR 1.10)

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A METHOD TO SYNCHRONISE DATA AND A TRANSMITTER AND A RECEIVER REALISING SAID METHOD

The present invention relates to a method to synchronise data as
5 described in the preamble of claim 1, and a transmitter and a receiver realising
said method as described in the preambles of claim 4 and claim 6.

Such a method to synchronise data is common knowledge. Indeed,
e.g. in communication systems where data is sent from a transmitter to a
receiver, for the receiver to be able to interpret the received data, the received
10 data have to be synchronised in the receiver with a reference signal, usual a
clock signal of the receiver. Realising synchronisation implies more complexity
and therefore there is a need for additional hardware or software in the receiver.
The trade-offs are generally between expense and complexity, on one hand, and
error performance on the other hand. However, some kind of receivers e.g.
15 receivers using asymmetric digital subscriber line technology are required to
have both, a low complexity and also a low error performance.

An object of the present invention is to provide a method to
synchronise data and a transmitter and a receiver realising said method of the
above known type but which are suited for use in communication systems where
20 a low complexity and a low error performance are required at the receiving side
of the communication system.

According to the invention, this object is achieved by the method to
synchronise data as described in claim 1, and the transmitter and the receiver
realising the method as described in claim 4 and claim 6, respectively.

Indeed, due to the trigger signals generated from the signal available
in the receiver and sent to the transmitter, the transmitter is able to send the data
to the receiver upon receipt of the trigger signals i.e. at the right time to ensure
synchronisation between the data received in the receiver and the available
signal e.g. a clock signal in the receiver. In this way, the complexity of the
30 synchronisation process is moved from the receiver side to the transmitter side of
the communication system and each level of synchronisation can be realised with

the required level of error performance and without making the receiver too complex.

- Another characteristic feature of the present invention is that the data, sent from the transmitter to the receiver, is asynchronous data. Indeed, upon receipt of the trigger signals, the transmitter must be able to send data even if the trigger signals are sent in an asynchronous way. This is for instance the case when the receiver has to receive the data at a time moment at which the data has just to fit at a predefined place in a frame. In this way frame synchronisation is achieved.
- Yet another characteristic feature of the present invention is that in the event that no data is available in the transmitter to be sent upon receipt of the trigger signals, the transmitter is able to generate idle data and to send this idle data to the receiver. In this way, e.g. the frame synchronisation proces is not disturbed. This is described in the method of claim 3 and the transmitter of claim 8.
- An important application of the present invention is that the receiver is included in an asymmetric digital subscriber line (ADSL) modem. This is described in claim 5. In such receiver, the received data is framed into an asymmetric digital subscriber line frame and sent over twisted pair. However in known ADSL modems using the known synchronisation methods, when the modem receives data at a higher frequency than the frequency at which the data is sent, the data has to be buffered before being framed. As already mentioned above, it is important to keep the complexity of a receiver in such a modem low. By using the method of the invention, the asymmetric digital subscriber line modem gets rid of the buffering aspect. In fact the buffering is again moved from the receiver to the transmitter which now must be able to buffer the data until he receives a trigger signal of the receiver to have the permission to sent the data to the receiver. Therefore, this way of synchronising is especially suited for systems wherein there is anyway buffering foreseen at the transmitting side, e.g. for Asynchronous Transmission Mode (ATM) systems.

The above mentioned and other objects and features of the invention will become more apparent and the invention itself will be best understood by referring to the following description of an embodiment taken in conjunction with the accompanying figure which is a block scheme of a synchronisation system 5 including a transmitter and a receiver realising the method of the invention.

Referring to the figure, the working of the synchronisation system will be described. First, the working of the synchronisation system will be explained by means of a functional description of the blocks shown in the Figure. Based on this description implementation of the functional blocks will be obvious to a 10 person skilled in the art and will therefore not be described in detail. In addition, the principle working of the synchronisation system will be described in further detail.

The synchronisation system includes a transmitter TX and an asymmetric digital subscriber line modem (ADSL modem) ADSL.

15 The transmitter TX includes four functional blocks :

- a buffer BUF;
- an idle data generating means ID-GEN ;
- a data sending means DAT-SEND; and
- a trigger receiving means T-RX.

20 The buffer BUF is included to buffer the data DAT presented to the transmitter TX. This data DAT can be digital data of any kind, however, for this embodiment the data DAT is asynchronous data i.e. data organised following the asynchronous transfer mode (ATM) technique. As mentioned, the buffer BUF buffers the data DAT presented to the transmitter TX. However, it has to be 25 understood that the buffer BUF will only do this when it is necessary i.e. when the transmitter receives more data DATA then he is allowed to send.

The idle data generating means ID-GEN is included to generate idle data. It has to be remarked that this one of the typical ATM functionalities. Idle data is sent whenever there is no information available at the side of the sender at the 30 moment of transmission. They allow a full asynchronous operation of both sender and receiver.

The data sending means DAT-SEND is included to send data from the transmitter TX to the ADSL modem. This data can be useful user information i.e. the data DAT coming from the buffer BUF or idle data, coming from the idle data generating means ID-GEN.

- 5 The trigger receiving means T-RX is included to receive trigger signals T coming from the ADSL modem. Upon receipt of such a trigger signal, the data sending means DAT-SEND is on his turn triggered by the trigger receiving means T-RX and is allowed to send data.

- The ADSL modem includes besides a receiver RX also the characteristic
10 functional blocks of an ADSL modem. Since the description of the ADSL technology goes beyond the scope of this invention, these functional blocks are not shown in the figure. However, it is worth to mention here that one of the functional blocks of such an ADSL modem is a framer which organizes overhead information and user information i.e. the incoming data DAT into ADSL frames,
15 i.e. uniformly sized groups of bits used to organize the ADSL data stream.

The receiver RX includes three functional blocks :

- trigger generating means T-GEN;
- trigger sending means T-SEND; and
- data receiving means DAT-RX.

- 20 The trigger generating means T-GEN is included to generate trigger signals T from an available signal SIG in the receiver RX. This available signal SIG is generated in accordance with the time moments whenever data DAT is needed to fit into an available ADSL frame on a predetermined place. This signal S is not necessary a clock signal. Indeed, looking to the form of an ADSL
25 frame, not the whole frame must be filled with data DAT, so by consequence, the signal S is not a signal with a constant frequency.

- It has to be remarked here that the trigger signals T are allowed to be of any kind e.g. one single bit pulse or a predefined codeword as long as the trigger generating means T-GEN of the receiver RX and the trigger receiving
30 means T-RX of the transmitter TX are lined up with each other.

The trigger sending means T-SEND is included to send the trigger signals T from the receiver RX to the transmitter TX and the data receiving means DAT-RX is included to receive the data DAT coming from the transmitter TX.

The transmission medium for sending the trigger signals is in the figure 5 depicted as a separate line to simplify the description of the working of the system. However these signals can (and usually are) transmitted over the same transmission medium, i.e. twisted pair, as the data.

The principle working of the synchronisation system will be described in the following paragraph.

10 Whenever data DAT is needed to fit in an available ADSL frame on a predetermined place, a trigger signal T is generated from the available signal SIG and transmitted to the transmitter TX. Upon receipt of a trigger signal T the trigger receiving means T-RX gives a signal to the data sending means DAT-SEND, e.g. by means of a control signal, and DAT-SEND on his turn requests 15 data DAT to the buffer BUF. When there is data DAT available in the buffer BUF, the data DAT is provided to the data sending means DAT-SEND. However, when no data DAT is available in the buffer, the synchronisation process may not be disturbed and the data sending means DAT-SEND requests idle data to the idle data generating means ID-GEN. The data, either user data or idle data, is 20 sent to the receiver RX and arrives there at the right moment to fit immediately into the ADSL frame on the predetermined place whereby synchronisation is established between the data DAT and the available signal SIG.

It has to be remarked that upon receipt of a trigger signal T, the transmitter TX has to send data DAT to the receiver RX. Sending data can be 25 done immediately after receiving of the trigger signal T, however the invention is not restricted to such kind of synchronisation systems but is also applicable for synchronisation systems where the data DAT is only sent after a predetermined period. Indeed, in this particular embodiment, the total period between the moment of generating a particular trigger and the moment of data DAT arriving 30 at the receiver RX to fit into a according predefined ADSL frame must be taken into account at initialisation time. It can be necessary to have a predetermined

waiting period somewhere in the loop in order to be able to realise the synchronisation. Since the complexity is moved from the receiver RX to the transmitter TX, this waiting period will also be realised by the transmitter TX.

- It has to be remarked that due to the cell structure of the ATM data stream
- 5 whenever idle data, not corresponding to a complete idle cell has been sent, that upon receipt of subsequent trigger signals T idle data has to be sent until the complete idle cell is transmitted, even if in the mean time some data DAT becomes available in the buffer BUF.

While the principles of the invention have been described above in

10 connection with specific apparatus, it is to be clearly understood that this description is made only by way of example and not as a limitation on the scope of the invention.

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CLAIMS

1. A method to realise synchronisation in a receiver (RX), of data (DAT) sent from a transmitter (TX) to said receiver (RX), with a signal (SIG) available in
5 said receiver (RX), characterised in that said method includes the steps of :
- in said receiver (RX) generating trigger signals (T) from said signal (SIG);
- sending said trigger signals (T) from said receiver (RX) to said transmitter (TX);
10 - upon receipt of said trigger signals (T) by said transmitter (TX) sending said data (DAT) from said transmitter (TX) to said receiver (RX).
2. The method according to claim 1, characterised in that said data (DT) is asynchronous data.
3. The method according to claim 1, characterised in that said
15 method further includes in the event that no data is available in said transmitter (TX) to be sent upon receipt of said trigger signals, sending idle data from said transmitter (TX) to said receiver (RX).
4. A receiver (RX) for receiving from a transmitter (TX) data (DAT), said data (DAT) having to be synchronous with a signal (SIG) available in said receiver
20 (RX), characterised in that said receiver (RX) includes:
- trigger generating means (T-GEN) to generate trigger signals (T) from said signal (SIG);
- trigger sending means (T-SEND) to send said trigger signals (T) from said receiver (RX) to said transmitter (TX);
25 - data receiving means (DAT-RX) to receive said data (DAT) sent by said transmitter (TX) upon receipt of said trigger signals (T) to said receiver (RX).
5. The receiver (RX) according to claim 4, characterised in that said receiver (RX) is included in an asymmetric digital subscriber line modem.
6. A transmitter (TX) for transmitting data (DAT) to a receiver (RX), said
30 data (DAT) having to be synchronous with a signal (SIG) available in said receiver (RX), characterised in that said transmitter (TX) includes :

- trigger receiving means (T-RX) to receive trigger signals (T), generated by said receiver (RX) from said signal (SIG) and sent from said receiver (RX) to said transmitter (TX);
 - data sending means (DAT-SEND) to send data (DAT) from said transmitter (TX) to said receiver (RX) upon receipt of said trigger signals (T).
- 5 7. The transmitter (TX) according to claim 6, characterised in that said transmitter (TX) includes means to send said data (DAT) in an asynchronous way.
- 10 8. The transmitter (TX) according to claim 6, characterised in that said transmitter (TX) includes idle data generating means (ID-GEN) to generate idle data and to send said idle data from said transmitter (TX) to said receiver (RX) in the event that no data (DAT) is available in said transmitter (TX) upon receipt of said trigger signals (T).

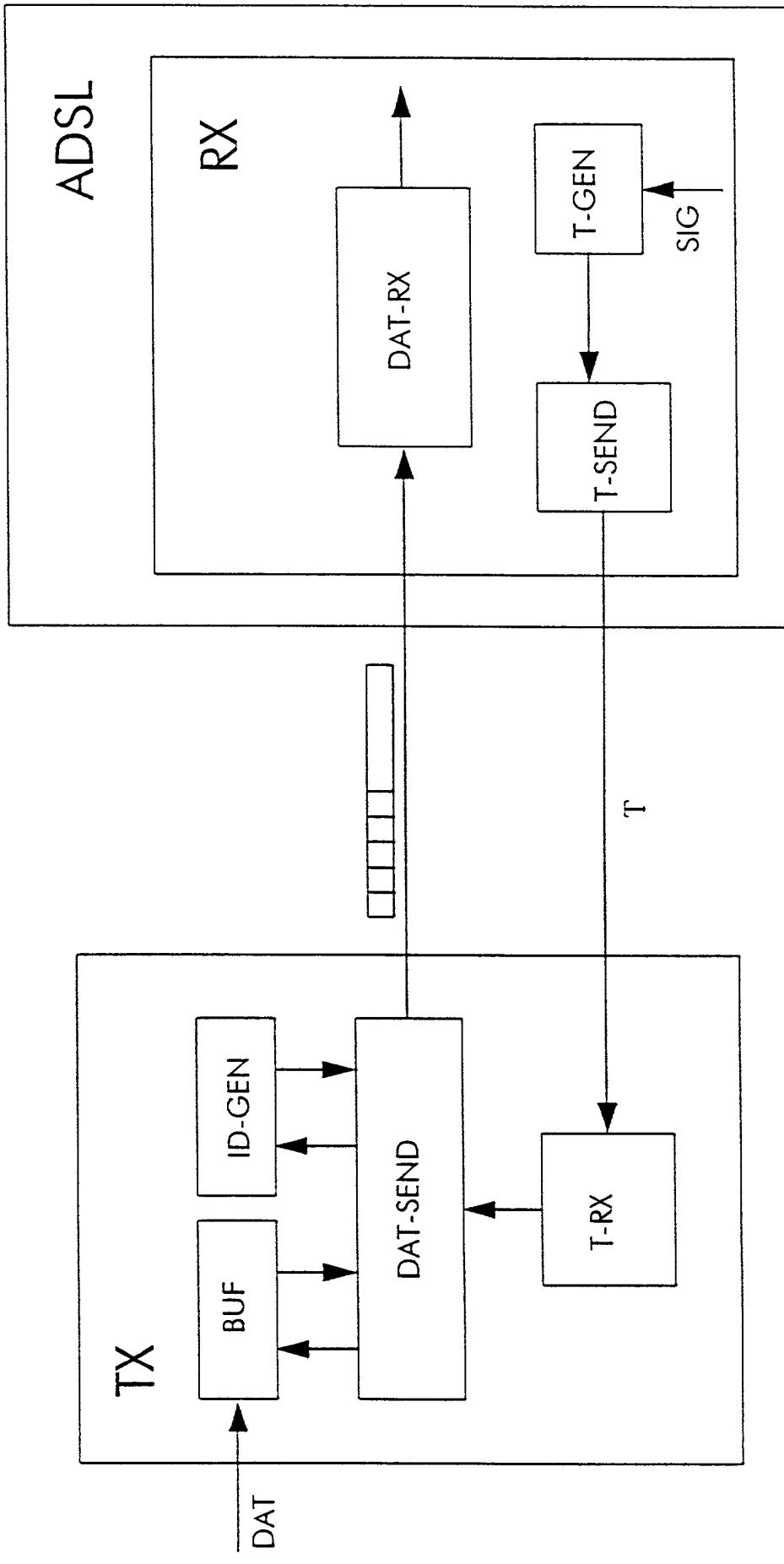
ABSTRACT

A METHOD TO SYNCHRONISE DATA AND A TRANSMITTER AND A RECEIVER REALISING SAID METHOD

- 5 A method to realise synchronisation in a receiver (RX), of data (DAT) sent from a transmitter (TX) to the receiver (RX), with a signal (SIG) available in the receiver (RX). The method includes the following steps :

 - in the receiver (RX) generating trigger signals (T) from the signal (S);
 - sending the trigger signals (T) from the receiver (RX) to the transmitter (TX);
 - upon receipt of the trigger signals (T) by the transmitter (TX) sending the data (DAT) from the transmitter (TX) to the receiver (RX).

10 (figure)



Declaration and Power of Attorney For Patent Application

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German Language Declaration

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I believe I am the original, first and sole inventor (if only one
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A METHOD TO SYNCHRONISE DATA
AND A TRANSMITTER AND A RECEIVER
REALISING SAID METHOD.

the specification of which

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is attached hereto

was filed on _____ as

Application Serial No. 0/

and was amended on _____
(if applicable)

I hereby state that I have reviewed and understand the con-
tents of the above identified specification, including the claims,
as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is ma-
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German Language Declaration

Prior foreign applications

Prior patent claims

Priority Claimed

96402393.1 (Number) (Nummer)	Europe (Country) (Land)	8-11-1996 (Day/Month/Year Filed) (Tag/Monat/Jahr eingereicht)	<input checked="" type="checkbox"/> Yes Ja <input type="checkbox"/> No Nein
 (Number) (Nummer)	 (Country) (Land)	 (Day/Month/Year Filed) (Tag/Monat/Jahr eingereicht)	 <input type="checkbox"/> Yes Ja <input type="checkbox"/> No Nein
 (Number) (Nummer)	 (Country) (Land)	 (Day/Month/Year Filed) (Tag/Monat/Jahr eingereicht)	 <input type="checkbox"/> Yes Ja <input type="checkbox"/> No Nein

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I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

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German Language Declaration

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Staatsangehörigkeit	Citizenship Belgian	
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